U.S. ARMY TECHNICAL CENTER FOR EXPLOSIVES SAFETY

EXPLOSIVES SAFETY

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OUTDOOR AMMUNITION STORAGE TIPS

It is DOD and DA policy not to store ammunition and explosives outdoors unless there is absolutely no other alternative. If all the possible solutions have been reviewed and temporary outdoor storage of ammunition is necessary, then PRIOR PLANNING IS ESSENTIAL. Operational convenience must not supersede explosives safety. Supervisors and planners need to know what the explosives limits are in areas designated to receive the overflow of ammunition and explosives. These areas must be prioritized with the best storage areas used first. The explosives limits of these areas must be carefully monitored to assure these areas are not overloaded.

Two principal hazards to ammunition and explosives in outdoor storage are fire and lightning. Temporary outdoor storage sites should be selected on the quality of protection afforded by the site. For instance, a concrete hardstand makes a good firebreak but seldom has lightning protection. That same concrete hardstand is superior to a site that offers no protection from fire or lightning.

Any outside storage of ammunition should have frequent inspections in order to remove combustible material (paper, tumbleweeds, etc.) around ammunition. The following list is recommended as a guide for utilization of outside storage areas to store ammunition and explosives until they can be put into covered storage. Some installations may have unique structures or areas that are better suited than the standard locations listed, and if so, this list can be modified.

- **Holding Yards (Truck/Rail/MILVAN)** - Generally, holding yards have a hardstand, lightning protection, and are licensed for a known amount of explosives. These are a good choice for outdoor storage of ammunition and explosives. Installations that do not have holding yards should consider constructing them.

- **Loading Docks (Truck/Rail/MILVAN)** - Most plants and depots have more loading docks than crews to operate them. Loading docks usually have a hardstand, lightning protection, and are licensed for a particular amount of explosives. Loading docks being utilized as 'working' loading docks should not be used as outdoor storage sites.

- **Classification Yard (Rail)** - Classification yards should not be utilized if other options are available. When used as a classification yard, they only require QD from external explosives locations. However, to use a classification yard as a temporary storage location would require the application of QD from and to external explosives locations plus internal QD between cuts of railcars. Generally, these areas do not have lightning protection.

- **Open Storage Sites not located between Magazines (Truck/MILVAN)** - These are small blocks of open storage locations that may have bermed storage pads. These are seldom used for explosives and the explosives limits in most cases are unknown. Explosives limits would need to be computed and firebreaks installed. Generally, these sites do not have lightning protection.

- **Suspect Car/Truck Site (Truck/Rail/MILVAN)** - Generally, this is a good site for QD and lightning protection purposes, but to utilize it as an open storage site means you no longer have a 'suspect car site' if you should need one. Generally, these areas are small and have small explosives limits. These sites should be retained for their original purpose, if possible.

- **Open Storage Sites between Magazines (Truck/MILVAN)** - These are bermed storage sites between earth-covered magazines. When the open spaces between magazines are utilized as outdoor storage locations, the explosives limits of the adjacent earth-covered magazines and the magazines to the front and rear of the site are severely reduced. If these sites are used, prior planning is essential to assure QD violations are not created. These sites would need to have firebreaks installed. They have no lightning protection.

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HAZARDS OF UNEXPLODED ORDNANCE (UXO)

Recent incidents involving unauthorized handling of dud and discarded UXO have occurred both in Southwest Asia (SWA) and at CONUS installations. The resulting injuries highlight the need to bolster existing countermeasures. *The key to prevention is education.*

The U.S. Army Training and Doctrine Command (TRADOC) Ordnance Missile and Munitions Center and School (OMMCS) is bolstering existing doctrine and training programs.

There is a continuous peacetime threat at installations with live fire ranges.

At these installations, no one is immune from UXO hazards. Ammunition can appear anywhere on an installation through the process of "migration." Migration involves a soldier retaining a round of ammunition as a souvenir and then later discarding it.

AR 385-63, Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat, 15 Nov 83, paragraph 2-10 establishes basic educational programs for installations having training ranges. In addition, the following should be considered:.

- Review unit safety briefings to ensure dud threat warnings are explicitly stated. Although such warnings are standard fare prior to entry on ranges, they are not always given prior to training or exercises in other areas. Recently, a soldier lost his hand when he handled an armed dud in a bivouac site that had never been an impact area and was supposedly clean.

- Use educational videotapes. "Simulators-The Real Thing," Army TVT #20-925, is available at training audiovisual support centers (TASCs). Although the specific subject is pyrotechnic hazards, many of this tape's lessons apply to any kind of ammunition. This 15-minute tape is specifically targeted for the soldier and shows graphic simulations of explosives accidents during troop exercises. Use of this tape is highly recommended.

- Televise warnings. Many Army installations or military communities are served by Army or armed forces television. These stations will produce and televise warnings as a public service. The videotape discussed above provides the station with sufficient footage from which to produce a short but highly effective televised warning. In addition, commercial television stations in the area may also wish to broadcast portions of this tape as a public service.

In summary, the key to prevention is education. From the unit NCOIC to the local television broadcast, awareness of the threat is the first big step to injury prevention.

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EXPLOSIVES SAFETY INFORMATION DATA BASE (ESIDB)

Response to the Explosives Safety Information Data Base has been excellent. We are getting requests from all corners of the community and even other services. We hope those of you who have logged onto the system have had time to come up with a suggestion or two for us. This is still a prototype system which is undergoing continual development. We need your feedback to help us develop the best explosives safety data base possible.

The USATCES is also developing new data bases and will be writing about these in future issues of this bulletin.

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MEASURING A MAST-TYPE LIGHTNING ROD

Have you ever looked at a mast-type lightning protection system and wondered how high the lightning rod was? Well, the height of the lightning rod is vital when figuring whether or not the mast gives adequate protection. One often-used method to find the height is to use a "cherry picker." A much easier method using ratios.

First, measure a nearby object and the shadow it casts. Let's say we have an 8 foot stop sign that casts a 6 foot shadow. Then, measure the length of the shadow cast by the lightning rod, say 72 feet. Set up the ratio like this:

$$\frac{\text{Height 1}}{\text{Shadow 1}} = \frac{\text{Height 2}}{\text{Shadow 2}}$$

So in this case:

$$\frac{8}{6} = \frac{H}{72}$$

Multiply both sides of the equation by 72:

$$\frac{8 \times 72}{6} = \frac{H \times 72}{72}$$

$$\frac{576}{6} = H$$

$$96 = H$$

96 feet is the height of the lightning rod. One important point to remember is to measure your shadows quickly. Don't wait between measurements because the sun's position will keep changing the length of the shadows. Ratios are handy math tools with many applications.

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DEVELOPMENT OF PMUAST

U.S. Tri-Service/Republic of Korea (ROK) discussions led to a mutual agreement that the Department of Defense (DOD)/ROK would enter into negotiations to formalize an Explosives Safety Cooperative Research and Development (R&D) Program.

Formal negotiations were concluded successfully in April 1991, and U.S./ROK representatives agreed on procedures to conclude/sign the Memorandum of Agreement (MOA). The signature process began 24 June 1991.

The purpose of the program is to develop, test, and validate new underground explosives storage techniques which, when utilized, will reduce explosives storage hazards and correct current deficiencies with no reduction in security, operational readiness, or logistical support.

Results of the effort are expected to produce approved explosives storage design concepts and have the impact of changing current U.S. safety standards.

The U.S. Army Technical Center for Explosives Safety (USATCES) was designated as the program management organization for the Army by the Executive Director for Explosives Safety (EDES). The Corps of Engineers (CE), U.S. Army Engineer Waterways Experiment Station (USAEWES), is the lead laboratory for the technical aspects for the U.S. program. The ROK Ministry of National Defense (MND) has developed a similar structure for their portion of the joint R&D program.

The program was certified by the Office of the Under Secretary of Defense (Acquisitions) (OUSD[A]) as an approved Nunn Cooperative R&D program. U.S. Army negotiated and concluded the MOA with the ROK.

The MOA was effective as of 12 August 1991. U.S. signature was Lieutenant General Billy M. Thomas, Deputy Commanding General for Research, Development, and Acquisition (DCGRDA), U.S. Army Materiel Command (AMC). The ROK signature was Major General Yoon, Jong-Ho, Director, Logistics Bureau, MND.

EXPLOSIVES ACCIDENT STATISTICS - FY 91

The U.S. Army Technical Center for Explosives Safety (USATCES) responsibilities in the 1988 Army Explosives Safety Management Plan mandates the collection and analysis of Army explosives accident data.

The responsibility was reiterated and directed by the Department of the Army Explosives Safety Council (DAESC) in 1990. Agreements between the Director of Army Safety (DASAF) and the Army's Executive Director for Explosives Safety (EDES) have resulted in a cooperative effort between the U.S. Army Safety Center (USASC) and USATCES to project accident statistics. The purpose is to identify trends and aid in development of new Army explosives safety policy as required.

The following explosives accident statistics are a compilation retrieved from the Army Safety Management Information Systems (ASMIS) Retrieval and Processing System (ARPS) using the search criteria for explosives types.

These FY 91 statistics represent explosives accidents reported to USASC on DA Form 285, U.S. Army Investigation Accident Report.

This is the first statistical report on Army explosives accidents in this Bulletin. We expect to report statistics on a quarterly basis. (NOTE: the amounts below are in thousands of dollars.)

TYPE	NUMBER	DAMAGE COST	INJURY COST	TOTAL COST
A	14	$41,306	$3,908	* $45,214
B	14	2,161	1,448	3,609
C	67	210	679	889
D	3	17	0	17
TOTAL	98	$43,694	$6,035	$49,729

*These dollar amounts include the accident at Doha, Kuwait, in July, 1991. The Doha accident damage cost of $40,441 plus the injury cost of $341 brings the total to $40,782. Subtracting this cost from the total cost for "A" accidents, leaves $4,432.

The EXPLOSIVES SAFETY BULLETIN targets the ammunition/explosives community. It is printed in Savanna, Illinois.

If you wish to submit an article that is of interest to the ammunition/explosives community, or if you have a request for more copies of the bulletin, please forward it to :Director, U.S. Army Technical Center for Explosives Safety, Attn: SMCAC-ESM, Savanna, Il 61074-9639 or call us at DSN 585-8745, commercial (815) 273-8745

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